LOWER COLUMBIA RIVER AND ESTUARY RESEARCH NEEDS IDENTIFICATION WORKSHOP

FLIPCHART NOTES – BREAKOUT SESSION 3

STRENGTHS OF THE KNOWLEDGE BASE

- No additional strengths identified

WEAKNESSES OF THE KNOWLEDGE BASE

- Tidally influenced area between Bonneville and the estuary
- Residence time
- Habitat selectivity
- Survival rates by species and stage
- The effects of engineering habitats (to the extent this may occur in restoration)
- Tidal swamps
- Sub-tidal habitats separate from the main channel
- Hydromorphic assessment for tidal wetlands; draft models for different wetland functions
- Lack of synthesis of existing information
- Individual fish use and returns
- Method to measure what processes form and affect habitat and how to return to those

KEY UNCERTAINTIES IN THE KNOWLEDGE BASE

- Need for definition of food web pathways and bio-connectivity*
- Wetland functions, including what makes "successful" wetlands

QUESTION 1: WHAT RESEARCH WOULD IMPROVE UNDERSTANDING OF HOW VARIOUS SALMON LIFE-HISTORY STRATEGIES FUNCTION IN THE ESTUARY?

- Pit-tags, new technologies
- Ability to resolve temporal variability
- Understand full sequence of habitats fish use
- Connect habitat to growth explicitly, not short-term growth measures, e.g. nutritional value for fish
- Genetic structure of populations
- "If open up habitat type again, will fish use it?"
- Construct models for how species types use the landscape
- How phenotypic expression of habitat use is related to genotype; measure through quantitative genetics*
- Life history diversity, broadly
- Strategic approach focus on restoration learning experience
- Maintain big picture context and use focused processes to evaluate within it

QUESTION 2: WHAT RESEARCH WOULD SUBSTANTIALLY CONTRIBUTE TO DEVELOPMENT AND APPLICATION OF AN ECOSYSTEM-BASED APPROACH TO SALMON HABITAT RESTORATION?

- Measure wetland areas
- Synthesis/integration of historical information including:
  - Hydrodynamics
  - Bathymetry
  - Sedimentation
  - Habitats themselves
  - Life history
  - Habitat use patterns
- Hierarchy of measurement approaches, rapid assessment technique and HGM approach to wetland function
- Coordination for synthesis of existing data and an overall look at current efforts
- Research that connects salmon growth and survival to habitats
- Survival measurements
- Residency and movement; connectivity of spatial scale
- Connection between physical and biological processes
- Management and research connection mechanism, partnerships and critique of existing efforts
- Definition of indicators and metrics
- Coordination of restoration activities and monitoring
- Review existing methods and efforts
- Survival-mortality broken down by river, mammal, bird predation, sediment, turbidity, etc.
- Monitoring driven by goals and objectives; scaled appropriately
- Information from Jones Beach to Bonneville*
- Link to returning adults
- Flux times of things through the system to build timeframe for evaluation of restoration efforts
- Institutional barriers including an assessment of organizational mandates, opportunities for cooperation, landowner involvement, etc.

QUESTION 3: WHAT ARE THE MOST IMPORTANT RESEARCH NEEDS?

*Note that the *'s above (in questions 1 and 2) indicate additional priority areas*

- Mortality and mortality implications
- Prioritize by the following *Research Identification Process*[1] *(7 points)*:

[1] Panelist Dr. Brian Riddell of ISAB developed the *Research Identification Process to assist in prioritizing important research needs; the breakout group agreed that most of the issues raised by participants during the session would fit into Dr. Riddell's proposed process*

1. Delimit the ecosystem of interest and determine the physical impact changes
2. Determine the habitat use by geographic area, species and sub-stocks (life history stages) – involves time and space strata
3. Determine mortality schedules by area, species and stocks
4. Given where mortalities occur, what ecosystem processes/issues have been disrupted and what could be "restored?"
5. Based on #4 above, prioritize research projects/tasks – selected programs will define goals and objectives for work
6. Based on objectives defined in #5, determine the required monitoring and evaluation to assess those activities; define the level of confidence required in this assessment
7. Programs likely require development of sampling techniques and tools and desire to establish sampling protocols for all agencies to use; techniques need to be specific to habitat types

- Figure out how to measure salmon habitat use
- Develop accepted sampling procedures/protocols through a collaborative process
- Residence time and survival in the plume and anywhere
- Better process understanding of the linkage of restoration options to the fish benefits
- Understanding the system as a whole to make management decisions
- Defining ecosystem function
- Defining indicators and performance standards
- Look at features of the system to help predict the future:
  - Geochemistry
  - Nutrients
  - Dynamics in the estuary
  - Sediments including suspended load in restoration sites
- Inventory of restoration opportunities and another level of assessment/understanding of wetlands for prioritization (how selecting one opportunity over another?)
- Invasive species impacts
- Cross-communication between physical and biological understanding through a relational database and/or modeling
- Baseline monitoring
- Effectiveness studies

QUESTION 4: WHAT ARE THE MAIN CONSTRAINTS TO ACCOMPLISHING THE CRITICAL RESEARCH?

- Lack of background/baseline data for comparison
- Time and money
- Institutional barriers including an assessment of organizational mandates, opportunities for cooperation, landowner involvement, etc.
- Greater linkage needed between local efforts and research
- Staffing and coordination
- Bureaucratic hurdles including permitting
- Sampling tools and technology
- Lack of local geographic focus in local university research efforts

- Lack of method to evaluate change effectively
- Statistical confidence intervals on biological measurements are large
- Lack of program coordination in terms of marks and objectives
- Need to identify when a response is seen, i.e. large scale
- Climate change may affect restoration adversely
- Uncertainty regarding management of hydrosystem as tied to future prediction
- Lack of linkages to regulatory agency efforts
- Public opinion driving research can pose challenges
- How funding of research matches up with agency mandates is largely unknown; where are the opportunities?
- Lack of stakeholder involvement
- Modeling is limited and imperfect